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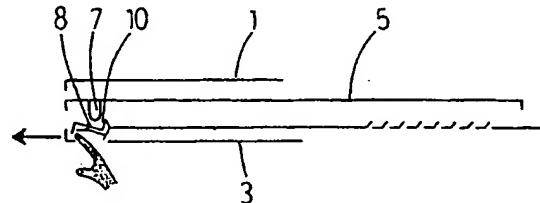
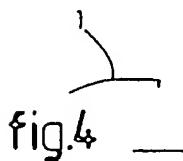
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(54) Sliding roof for a vehicle.

(57) A sliding roof for a vehicle having an opening (2) in its fixed roof (1), comprises a panel (5) being displaceable between a closed position in which it closes the opening (2) in the fixed roof (1), and an open position in which it has been slid from the closed position backwardly under the fixed roof (1) thereby at least partially opening the roof opening (2). It further comprises a sun shade (6) which is

movable below the panel (5) between a closed position under the roof opening (2) and a backwardly displaced position under the fixed roof (1). According to the invention the sun shade (6) is constructed such that, in the backwardly slid position of the panel (5), it is movable forwardly beyond the panel (5) to its closed position.



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## SLIDING ROOF FOR A VEHICLE

The invention relates to a sliding roof for a vehicle having an opening in its fixed roof, comprising a panel being displaceable between a closed position in which it closes the opening in the fixed roof, and an open position in which it has been slid from the closed position backwardly under the fixed roof thereby at least partially opening the roof opening; and a sun shade being movable below the panel between a closed position under the roof opening and a backwardly displaced position under the fixed roof.

Such sliding roofs are known in various embodiments, both as normal sliding roofs and as tilting and sliding roofs in which the panel can also be tilted upwardly from the closed position to a venting position. In case of a transparent panel the sun shade serves to fully or partially close the roof opening to light when the panel is in the closed position or venting position. When the panel is slid backwardly the sun shade is automatically carried along so that the roof opening is opened completely.

The invention has the object to increase the uses of the known sliding roofs.

For this purpose the sliding roof according to the invention is characterized in that the sun shade is constructed such that, in the backwardly slid position of the panel, it is movable forwardly beyond the panel to its closed position.

Due to the invention it is made possible to open the roof opening by the panel and consequently provide for a good ventilation, but to close the sun shade at least partially thereby obstructing the sun light and thus offering the passengers of the vehicle a pleasant cooling without this being eliminated by the radiation heat of the sun. The cooling effect in the interior of the vehicle will generally be stronger in this way than in case of a tilting and sliding roof wherein the panel is set in the venting position and the sun sunshade is closed partially. Of course, the ventilation with the sliding roof according to the invention will be stronger when there are provided ventilation apertures or louvers in the sun shade, while in that case it is also possible to close the sun shade completely but still effecting a ventilation. For this purpose there could also be provided ventilation apertures in the frame or the roof lining.

To further increase the operational comfort of the sliding roof it is possible according to the invention to provide a carrier device for moving the sun shade at least backwardly along with the panel, said carrier device being adapted to be made inoperable.

In this manner the sun shade is automatically

opened during the opening sliding movement of the panel, on the one hand, but the possibility to close the sun shade in the open position of the panel is maintained on the other hand, by making the carrier device inoperable and sliding the sun shade forwardly, for instance manually.

Said carrier device may, for example, comprise a stiffening edge provided under the panel and serving as carrier means, and a coupling means mounted to the sun shade and being adjustable, preferably in vertical height, between an operative coupling position and an inoperative uncoupling position.

For effecting a built-in height of the sliding roof which is as small as possible to create head room for the passengers in the vehicle which is as large as possible, it is important to position the sun shade as close as possible under the panel. For this purpose the sun shade should be as flat as possible on the upper side without any projection that could interfere with the panel.

If there should be provided a transverse stiffening on the front side of the sun shade, for example, then it is preferably formed on the underside of the sun shade, so that it cannot come into contact with the carrier means, if any, at the underside of the panel. When the sun shade is slid into the opened position between the fixed roof and a roof lining of the vehicle, a stiffening edge on the front side of the sun shade will generally remain projecting in front of the roof lining in order to be able to position the roof lining as close as possible to the sun shade and to keep a hand grip of the sun shade obtainable at all times.

The invention will hereafter be elucidated with reference to the drawing showing an embodiment of the sliding roof according to the invention by way of example.

Fig. 1 is a very schematic plan view of a tilting and sliding roof according to the invention mounted into a vehicle.

Fig. 2-5 are longitudinal sectional views of the mounted tilting and sliding roof according to fig. 1, in various positions.

In the drawing there is shown an embodiment of a sliding roof or a tilting and sliding roof, respectively that is adapted to be mounted under the fixed roof 1 of a vehicle, such as an automobile, wherein an opening 2 is made or saved in the fixed roof 1.

The sliding roof comprises a stationary frame 3 having a passage opening 4 substantially lying under the opening 2 in the fixed roof 1 in the mounted condition of the sliding roof. The frame 3 movably supports a panel 5 which, in general, is

made at least partially of a transparent rigid material, such as glass or transparent plastic. The panel can be moved by a displacement mechanism which is drivable manually or by a motor. Such a displacement mechanism is widely known and does not form part of the invention so that a description thereof is omitted.

The panel 5 closes the opening 2 in the fixed roof 1 in its closed position (fig. 2) and is displaceable from this closed position first downwardly and then backwardly between the fixed roof and the rear part of the stationary frame 3 such that the roof opening 2 is opened fully or partially. From this position, the panel 3 can be displaced in reverse sense to the closed position. If the sliding roof is constructed as a tilting and sliding roof or the panel 5 may also be tilted upwardly from its closed position to a venting position (see the dash line in fig. 2).

The sliding roof further comprises a sun shade 6 adapted to be slid, for example manually, back and forth and for this purpose it is guided with both side edges in a guide rail of the frame 3. In its front, closed position the sun shade 6 closes the passage opening 4 in the stationary frame 3, while the sun shade 6 is adapted to be slid from this closed position backwardly into the space between the fixed roof 1 of the vehicle and the rear portion of the stationary frame 3 (fig. 3 and 4).

On behalf of the rearward sliding movement of the sun shade 6 together with the movement of the panel 5 there is provided a carrier device. In the embodiment shown by way of example this carrier device comprises the stiffening edge formed on the underside of the panel 5 near the front edge thereof and serving as carrier means 7 adapted to come into engagement with a coupling means 8 being mounted on the sun shade 6 in the neighbourhood of a hand grip 9 for manually operating the sun shade 6.

The coupling means 8 which is provided in the sun shade in a movable manner, in this case tiltable about a horizontal axis, to be able to move between an operative coupling position and an inoperative uncoupling position. By a spring means (not shown) the coupling means is loaded to its operative coupling position. In this operative coupling position an upright edge 10 of the coupling means 8 protrudes upwardly to such an extent that it is lying in the path of the carrier means 7 of the panel 5. On its rear side the upright edge is provided with a backwardly and downwardly inclining ramp 11.

At the front edge of the sun shade 6 there is formed a stiffening edge 12 to provide rigidity to the sun shade 6. This stiffening edge 12 projects downwardly from the plane of the sun shade 6 in order to stay out of engagement with the carrier

means 7 of the panel 5.

In the rear portion of the sun shade ventilation apertures 13 are formed to provide for ventilation between the interior of the vehicle and the open air in the closed position of the sun shade 6.

The operation of the sliding roof according to the invention is as follows:

Fig. 2 illustrates the fully closed position of the sliding roof, wherein both the panel 5 and the sun shade 6 are in their front closed position.

From this closed position the panel 5 may be displaced slightly downwardly by the displacement mechanism as a result of which the panel 5 is able to be slid backwardly under the fixed roof 1. During this backward displacement the carrier means 7 under the panel 5 will come into engagement with the upright edge 10 of the coupling means 8 on the sun shade 6 so that the sun shade 6 will be carried along backwardly by the panel 5.

Fig. 3 shows the fully opened position of the sliding roof wherein the panel 5 and the sun shade 6 are between the fixed roof 1 and the rear portion of the stationary frame 3, or the roof lining of the vehicle, respectively, to such an extent that only the portion of the sun shade 6 having the hand grip 9 projects on the front side.

As is shown in fig. 4 it is possible in this position to operate the coupling means 8 near the hand grip 9 of the sun shade so that the upright edge 10 of the coupling means 8 is moved downwardly and may pass the carrier means 7 at the underside of the panel 5 so that the sun shade 6 may be displaced forwardly beyond the panel 5 to the closed position, as is shown by fig. 5. In this position an air stream between the interior of the vehicle and the open air may take place through the ventilation apertures 12 in the sun shade 6, but the sun-rays are obstructed by the sun shade 6 so that a pleasant cooling effect can be obtained in the interior of the vehicle. Of course, the operation of the coupling means 8 can take place not only in the fully opened position according to fig. 4, but also in any intermediate position of the panel 5 and the sun shade 6.

If the panel 5 is displaced from the position of fig. 5 in reverse sense to the closed position, the carrier means 7 will run up against the inclined ramp 11 of the upright edge 10 of the coupling means 8 when the panel 5 is near the front position, whereby the coupling means 8 will tilt against the spring pressure and in this manner the carrier means 7 may automatically pass the upright edge 10 of the coupling means 8 and, with a subsequent backward movement of the panel 5, the carrier means 7 is able to carry along the sun shade 6 again.

From the foregoing it will be clear that the invention provides a sliding roof offering many pos-

sibilities to ventilate in combination with a high operational comfort.

The invention is not restricted to the embodiment described hereinbefore and shown in the drawing by way of example, which can be varied in different ways within the scope of the invention. For example it is possible to make the panel of an opaque material and to construct the sun shade as a cover for the under side of the panel.

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### Claims

1. Sliding roof for a vehicle having an opening (2) in its fixed roof (1), comprising a panel (5) being displaceable between a closed position in which it closes the opening (2) in the fixed roof (1), and an open position in which it has been slid from the closed position backwardly under the fixed roof (1) thereby at least partially opening the roof opening (2); and a sun shade (6) being movable below the panel (5) between a closed position under the roof opening (2) and a backwardly displaced position under the fixed roof (1), characterized in that, the sun shade (6) is constructed such that, in the backwardly slid position of the panel (5), it is movable forwardly beyond the panel (5) to its closed position.
2. Sliding roof according to claim 1, wherein there is provided a carrier device (7,8) for moving the sun shade (6) at least backwardly along with the panel (5), said carrier device (7,8) being adapted to be made inoperable.
3. Sliding roof according to claim 2, wherein the carrier device (7,8) comprises a stiffening edge (7) provided under the panel (5) and serving as carrier means, and a coupling means (8) mounted to the sun shade (6) and being adjustable, preferably in vertical height, between an operative coupling position and an inoperative uncoupling position.
4. Sliding roof according to claim 3, wherein the coupling means (8) is biased to the operative position, for instance by a spring means.
5. Sliding roof according to claim 3 or 4, wherein the sun shade (6) is provided near the front edge with a hand grip (9) formed under the sun shade, and the coupling means (8) being disposed in the neighbourhood of the hand grip (9) and being operable through the hand grip.
6. Sliding roof according to one of the preceding claims, wherein there is provided a transverse stiffening (13) at the front edge of the sun shade (6) extending from the plane of the sun shade (6) exclusively downwardly.

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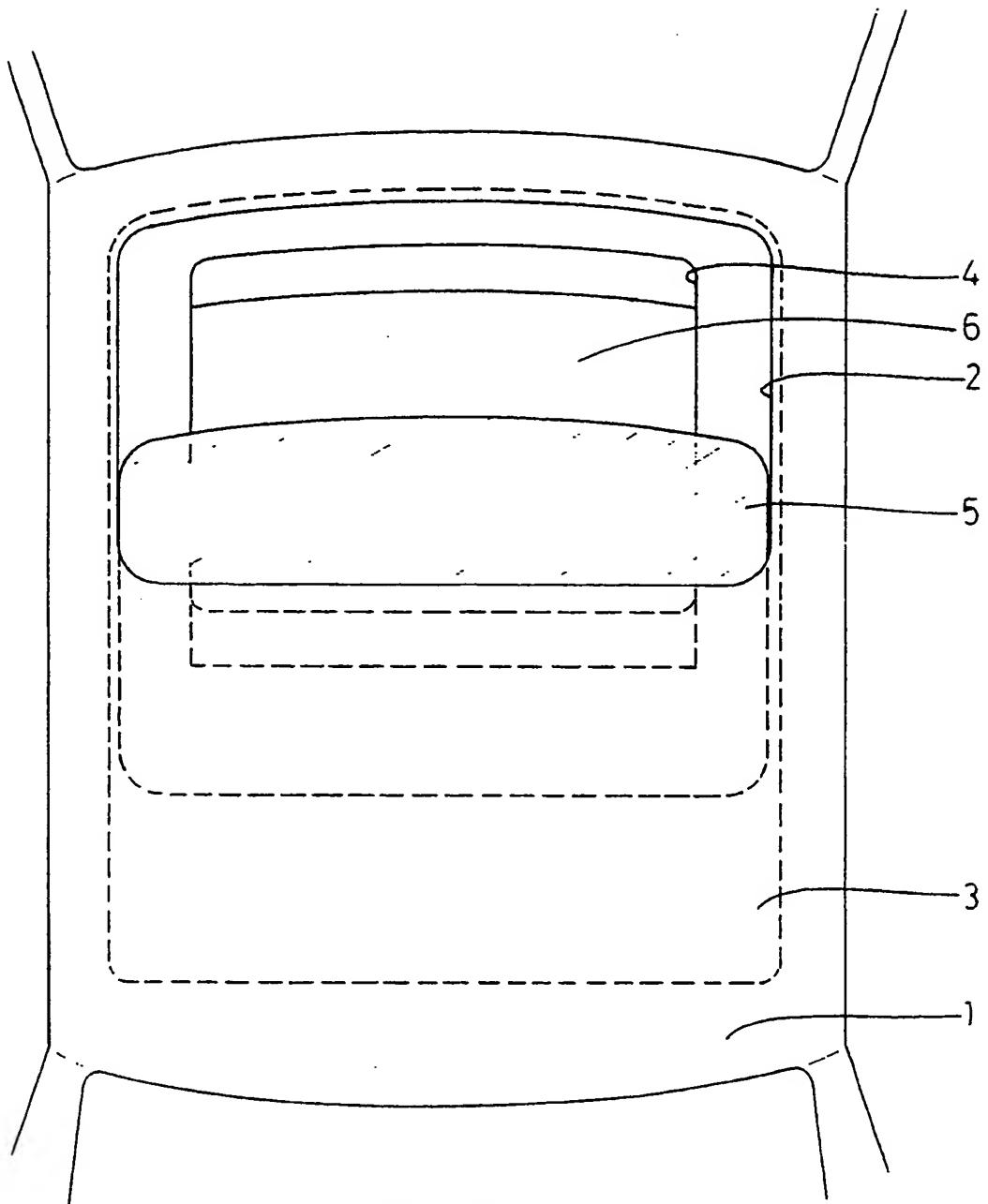


fig.1

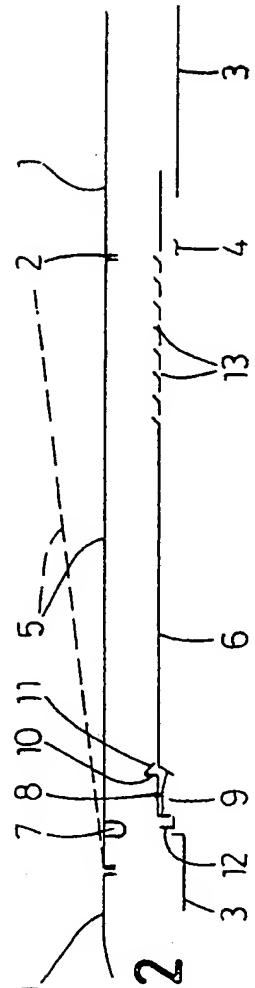


fig.2

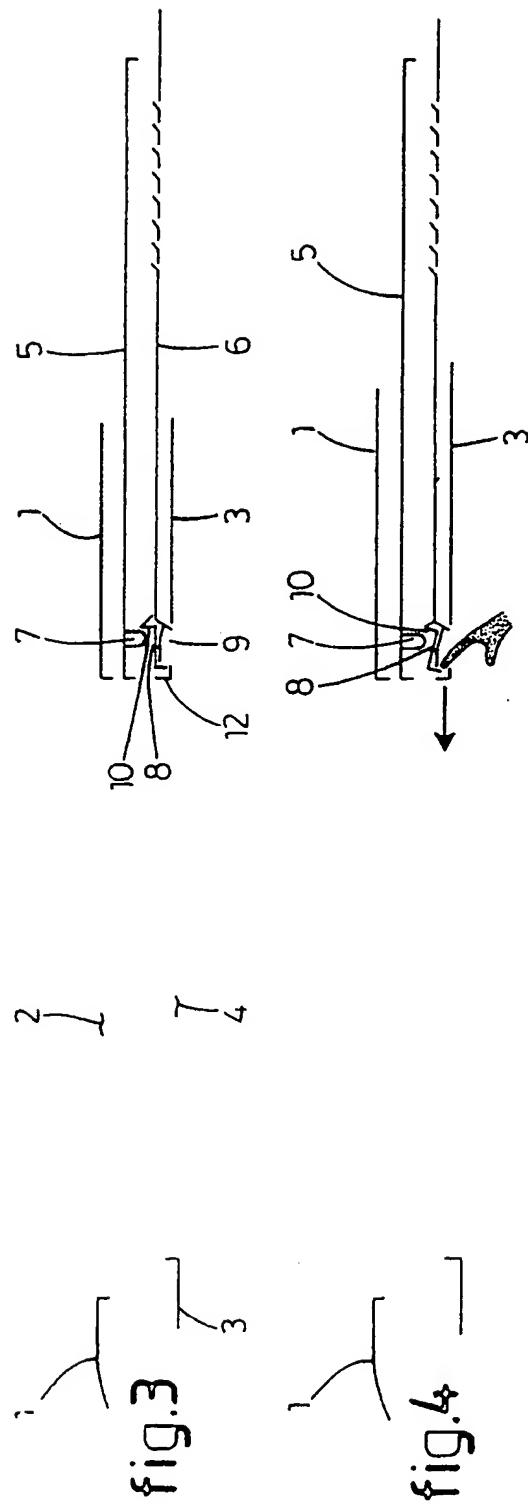


fig.3

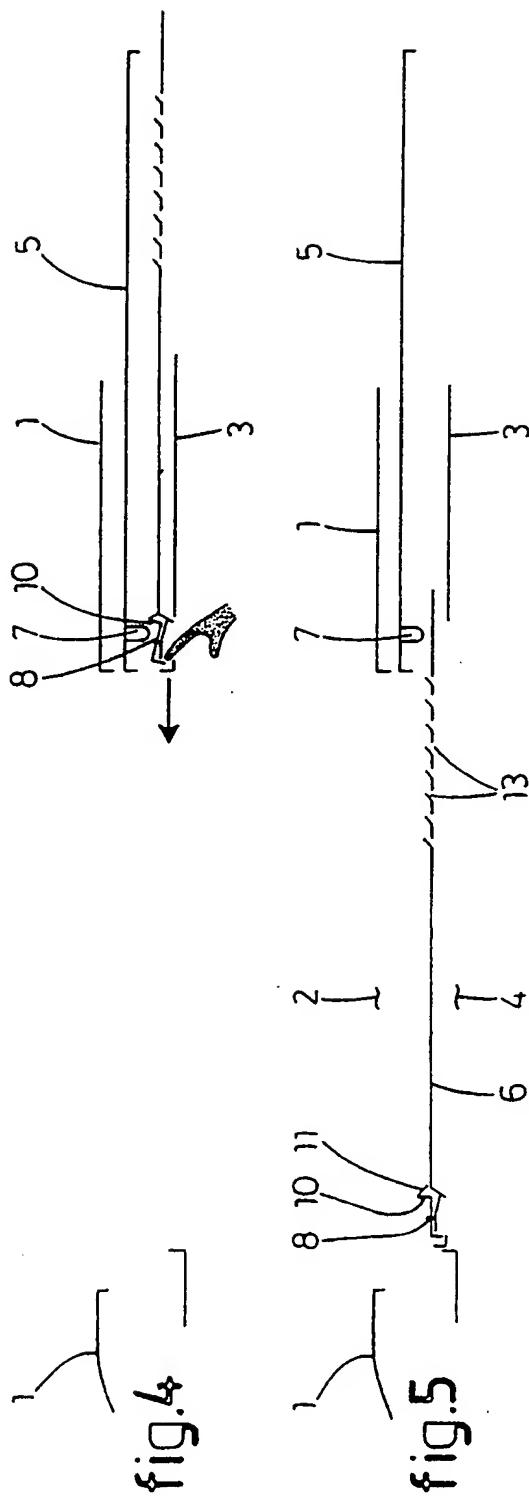


fig.4

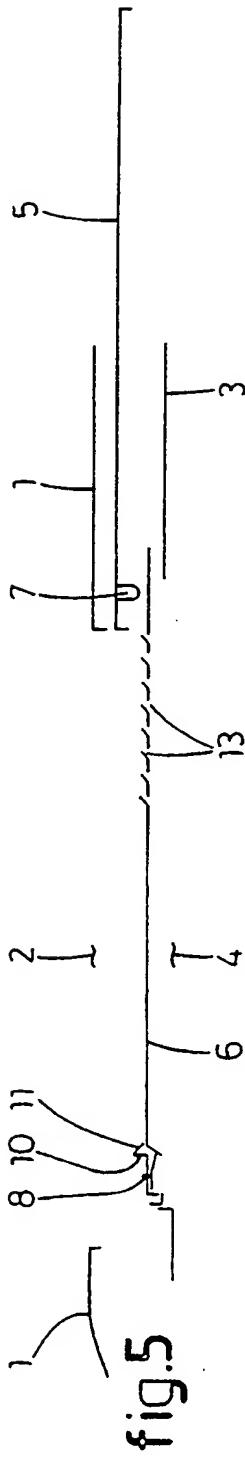


fig.5



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## EUROPEAN SEARCH REPORT

Application Number

DOCUMENTS CONSIDERED TO BE RELEVANT			EP 90201526.2						
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)						
P, X	<u>EP - A1 - 0 338 614</u> (VERMEULEN-HOLLANDIA) * Totality *	1	B 60 J 7/04 B 60 J 3/02						
A	<u>DE - A1 - 2 923 904</u> (WEBASTO-WERK) * Totality *	1							
A	<u>DE - C1 - 3 527 839</u> (ROCKWELL GOLDE) * Totality *	1							
A	<u>EP - A2 - 0 035 371</u> (BRITAX WEATHERSHIELDS) * Totality *	1							
A	<u>US - A - 4 674 789</u> (WATJER) * Totality *	1							
A	<u>DE - A1 - 3 248 413</u> (WEBASTO-WERK) * Totality *	1	TECHNICAL FIELDS SEARCHED (Int. Cl.5)						
	-----		B 60 J						
<p>The present search report has been drawn up for all claims</p> <table border="1"> <tr> <td>Place of search</td> <td>Date of completion of the search</td> <td>Examiner</td> </tr> <tr> <td>VIENNA</td> <td>12-10-1990</td> <td>HENGL</td> </tr> </table> <p><b>CATEGORY OF CITED DOCUMENTS</b></p> <p>X : particularly relevant if taken alone  Y : particularly relevant if combined with another document of the same category  A : technological background  O : non-written disclosure  P : intermediate document</p> <p>T : theory or principle underlying the invention  E : earlier patent document, but published on, or after the filing date  D : document cited in the application  L : document cited for other reasons  &amp; : member of the same patent family, corresponding document</p>				Place of search	Date of completion of the search	Examiner	VIENNA	12-10-1990	HENGL
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